higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

SYSTEM ANALYSIS AND DESIGN
NQF LEVEL 4

(10041004)

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09:00–12:00

Non-programmable calculators may be used.

This question paper consists of 15 pages.

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)
SYSTEM ANALYSIS AND DESIGN
NQF LEVEL 4
TIME: 3 HOURS
MARKS: 200

INSTRUCTIONS AND INFORMATION

1. Answer all the questions.
2. Read all the questions carefully.
3. Number the answers according to the numbering system used in this question paper.
4. Start each section on a new page.
5. Use only a black or blue pen.
6. Write neatly and legibly.

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SECTION A

QUESTION 1

1.1 Various options are given as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question number (1.1.1–1.1.10) in the ANSWER BOOK.

1.1.1 Which type of user interface input is designed to mimic the actions of a physical object and often requires gestures like tapping, pinching, or swiping?



A Voice commands.
B Keyboard shortcuts.
C Mouse clicks.
D Touchscreen interactions.

1.1.2 Which ONE of the following is NOT related to acceptable and unacceptable ICT usage?

A Users are aware that acceptable and unacceptable policy exist, and their actions should adhere to the policy.

B Users cannot deny any actions that they perform while accessing company assets or other ICT-based resources through the internet access provided by the company.
C Users develop various possible ways of addressing the problem and propose the best approach.
D Users cannot deny awareness of required behaviour.

1.1.3 Who in an organization is usually in charge of making sure that the Acceptable Use Policy for software is followed?

A Human Resources
B IT Support Team
C Marketing Department
D Sales Department


1.1.4 Software licences are agreements that …

A provide specific conditions for use of the software.
B users must accept before using the software.
C outline the rights to use the software.
D All of the above.

1.1.5 Which software security control is used to identify and authenticate users based on their unique physical characteristics, such as fingerprints or facial features?


A Firewall
B Virtual Private Network (VPN)
C Biometric authentication
D Intrusion Detection System (IDS)

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1.1.6 The goal of … is to find and fix as many errors and bugs as possible before different software modules are put together.

A user testing
B unit testing
C alpha testing
D stress testing

1.1.7 Questionnaires are useful for gathering data from a large number of users but are limited in terms of …

A the depth and accuracy of the answers.
B the limited number of respondents.
C questions being asked in a correct way.
D record reviews.

1.1.8 Which of the following is NOT a component of the structured analysis approach.

A Data flow diagrams (DFDs).
B Entity-Relationship diagrams (ERDs).
C Structure charts.
D Use case diagrams.

1.1.9 In the … approach one module of the new information system is activated at a time.

A system development life cycle
B case tool
C phased conversion
D success factor

1.1.10 … testing tests the behaviour of a group of modules or methods.

A Driver
B Integration
C System
D Unit

(10 × 1) (10)

1.2 Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'True' or 'False' next to the question number (1.2.1–1.2.10) in the ANSWER BOOK.

1.2.1 Well-designed output and reports should consider the needs and preferences of end-users to ensure they find the information valuable and usable.

1.2.2 Computer-aided software engineering (CASE) tools were developed to make systems developers' work easier and more consistent.

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1.2.3 New versions or releases of software with associated updates to documentation, training, and support are not part of the maintenance phase.

1.2.4 One of the key emphases of Extreme Programming is to use a three-person programming team.

1.2.5 Small projects do not have any risk.

1.2.6 When interviewing someone, the interviewer should make sure the questions imply whether an answer is right or wrong.

1.2.7 While representing an entity, each non-key attribute of the entity type becomes a key attribute of the relation.

1.2.8 Database normalisation is the process of organizing data in a database to reduce data redundancy and improve data integrity.

1.2.9 The main goal of process decomposition is to make the process more complicated and harder to understand.

1.2.10 An aggregation is an association between the instances of one or more entity types that is of interest to the organisation.

(10 × 1) (10)

1.3 Write the following abbreviations in full:

1.3.1 GUI

1.3.2 IDE

1.3.3 PERT

1.3.4 CRM

1.3.5 SQL

1.3.6 RDBMS

1.3.7 XP

1.3.8 BPR

1.3.9 3NF

1.3.10 CAD

(10 × 1) (10)

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1.4 Choose a/an word/item in from COLUMN B that matches a description in COLUMN A. Write only the letter (A–S) next to the question number (1.4.1–1.4.10) in the ANSWER BOOK.

COLUMN A		COLUMN B	
1.4.1	Occurs prior to the client accepting the new system	A	open ended
1.4.2	Someone who plays a role that requires them to interact with a system from outside the boundary of the system	B	cloud-based
1.4.3	Process of verifying the accuracy, integrity, and validity of data	C	process flow diagram
1.4.4	Storage of information without requiring a network connection	D	interviewee
1.4.5	Types include level 1 and context	E	permission
1.4.6	Questions that can be answered by a simple 'yes' or 'no'	F	access control
1.4.7	Person supplying information through a questionnaire	G	beta test
1.4.8	Adding features and functionality without due approval	H	off-line
1.4.9	Minimising, checking, and controlling the probability of unfortunate occurrences	I	synapses
1.4.10	The right to be treated without discrimination, especially on the grounds of one's gender, race or age	J	data flow diagram
		K	respondent
		L	scope-creep
		M	open questions
		N	local
		O	equal opportunity
		P	actor
		Q	validation
		R	close ended
		S	risk assessment

(10 × 1) (10)
[40]

TOTAL SECTION A: 40

SECTION B

QUESTION 2

2.1 Read the following extract and answer the questions below:

South African IT sector

South Africa has one of the largest information and communications technology (ICT) markets in Africa.

Business software spending may be driven by customer-centric industries such as retail, financial and telecoms, where businesses are recognizing that solutions can be a competitive differentiator. Cloud-based software products are expected to drive growth.

This sub-sector is still hampered by piracy, and it is estimated by the Business Software Alliance (BSA) that around 35 percent of installed software in SA is illegal. The need for security products is growing with company spending increasing to about 8 percent of the total IT budget. The higher end of South Africa's software market has matured, and companies are price sensitive and cautious about investing in new technologies. This may bring opportunities for software that integrates platforms.

[Adapted from: https://www.trade.gov/knowledge-product/south-africa-information-technology]

2.1.1 What is *software piracy*? (2)

2.1.2 To which institution can software piracy be reported to? (1)

2.1.3 What does the term *'softlifting'* or '*softloading'* mean? (1)

2.2 Read the following extract and answer the questions below:

IITPSA

Each member of the IITPSA is expected to adhere to the Institute's Codes of Behaviour (Code of Ethics and Code of Good Practice).

When a member joins the Institute, he / she agrees to abide by the Codes and all other rules and regulations of the IITPSA.

[Adapted from: https://www.iitpsa.org.za/codes-of-behaviour]

2.2.1 What does IITPSA stand for? (1)

2.2.2 Define the concept: *Code of Ethics.* (2)

2.2.3 List any FOUR actions or behaviours that are examples of typical codes of ethics such as the ones that the IITPSA prescribe. (4 × 1) (4)

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2.2.4 Name ONE other professional IT body in South Africa (1)

[12]

QUESTION 3

3.1 Study the following statement and diagram and answer the questions that follow:

IT Risk management

As a (CIO) or head of (IT), you know what IT risk management is. It's all about applying risk management concepts to IT projects, including how IT is used, who owns it, how it's run, and how it affects the business as a whole. In terms of the language of risk management, do these ideas get across to everyone in the organisation? That is the big question!



[Adapted from: https://www.opscentre.com/blog/2016/09/06/adjusting-risk-management-language-business-colleagues//]

3.1.1 Define the term *risk assessment.* (2)

3.1.2 It is very important for a project manager to take risk management seriously.

Discuss THREE implications of risks and threats to IT project development in general. (3 × 2) (6)

3.1.3 Explain the following formula, by referring to each of the terms in the context of IT project risks:

$$Risk = Probability \times Consequence$$ (3)

3.1.4 Explain the term *contingency plan*. (2)

3.1.5 Expand the acronym: *CIO* (1)

3.2 Differentiate between any TWO examples of hardware security controls that can be implemented to protect an organisation's ICT infrastructure and software systems. (2 × 2) (4)

[18]

QUESTION 4

Read the following scenario and answer the questions below:

You have been employed as a junior systems analyst at the ABC Software Solutions. ABC Software Solutions specialises in providing enterprise resource planning systems to its clients. The entire team of systems analysts must gather data that will eventually assist them to select the best ERP solution that will best suit their client needs.

4.1 Define the following terms:

4.1.1 *Metadata*

4.1.2 *Structured interview*

4.1.3 *Ambiguous question*

(3 × 2) (6)

4.2 List TWO disadvantages of collecting data through observation. (2)

4.3 As a junior systems analyst, you have decided to use interviews as the main data gathering technique.

List FIVE advantages of using interviews as a method for collecting data.

(5 × 1) (5)

4.4 Closed-ended questions enable analysts to control the interview and obtain the information they need. Answers to the questions require only a short answer of one or two words.

4.4.1 Differentiate between THREE types of closed-ended questions.

(3 × 2) (6)

4.4.2 Design one applicable closed-ended question of each of the types you mentioned in QUESTION 4.4.1.

(1 mark will be allocated for your design and 1 mark for the relevance to the given scenario) (3 × (1+1)) (6)

[25]

QUESTION 5

5.1 Define the following terms:

5.1.1 *Joint application development (JAD)*

5.1.2 *Agile modelling*

5.1.3 *Object Oriented*

(3 × 2) (6)

5.2 Draw a simple process flow diagram for the following scenario.

At the XYZ TVET college an opportunity arose by a sponsor to allow students to apply for a special once-off bursary. The college sponsor has implemented an online system to manage the applications. Students will submit their application online and upload all the required supporting documents. A student's application will not be processed until all supporting documents are not uploaded. Once all documents are uploaded the student's application is reviewed. For all successful applicants an official email is sent with further information. Unsuccessful applicants are informed with an SMS.

(10)

5.3 Study the two database tables below and answer the questions that follow:

Lecturer_Code	First_Name	Last_Name	Qualification
PERS001	Michael	Van Zyl	BCom
PERS002	Themba	Nene	BTech
PERS003	Sarah	Jackson	BSc
PERS004	Lindiwe	Zulu	BA

TABLE 1: Lecturers Table

Class_ID	Location	Lecturer_Code
1	NW_Block	PERS003
2	NE_Block	PERS004
3	SE_Blcok	PERS002

TABLE 2: Classes Table

5.3.1 Identify the primary key in the Lecturers Table (TABLE 1).

5.3.2 Identify the primary key in the Classes Table (TABLE 2).

5.3.3 Identify the foreign key in the Classes Table (TABLE 2).

5.3.4 Identify the relationship type between the two tables (i.e., the cardinality).

(4 × 1) (4)

5.4 What is the function of the primary key? (2)

5.5 Study the following dataset regarding the student club at the XYZ TVET college and answer the questions that follow:

StudentNr	Surname	Initials	ContactNr	RoleCode	RoleDescrition	CourseCode	CourseName
2302158931	BALOYI	RS	0715238734	M01	Normal member	NCV_IT	Computer Science and Information Technology
2390418122	MKANSI	K	0721892498	M02	Vice chairperson	NCV_OA	Office Administration
2393162851	MOBENG	DL	0737559723	M03	Chairperson	NCV_Mar	Marketing
2300611506	KUIPERS	S	0749925806	M01	Normal member	NCV_FEA	Finance, Economics and Accounting
2102586207	MOGASE	TTI	0788444121	M07	Senior Member	NCV_Hos	Hospitality
2336353014	SEREPA	MC	0796663137	M02	Vice chairperson	NCV_PA	Primary Agriculture
2344889901	SHILOWA	L	0815221436	M04	Finance officer	NCV_OA	Office Administration
2346545472	RANGOATO	RF	0823836692	M05	Marketing officer	NCV_Hos	Hospitality
2346906162	NKONWANA	G	0834441159	M06	Marketing officer	NCV_OA	Office Administration
2247778609	MAPONYA	ITS	0645553364	M01	Normal member	NCV_FEA	Finance, Economics and Accounting
2250387181	NEL	KJ	0758667709	M01	Normal member	NCV_FEA	Finance, Economics and Accounting
2251901703	NZINZAMA	TP	0863779102	M01	Normal member	NCV_IT	Computer Science and Information Technology
2252064162	SITHOLE	BS	0826887835	M01	Normal member	NCV_Hos	Hospitality
2353596543	MOSENA	LK	0834992351	M04	Finance officer	NCV_PA	Primary Agriculture
2153778812	NAIDOO	MS	0832006345	M07	Senior Member	NCV_Mar	Marketing
2154870161	LUGONGOLO	S	0720101702	M07	Senior Member	NCV_IT	Computer Science and Information Technology

Student club list

5.5.1 Define the term: *normalisation*. (2)

5.5.2 Analyse the given dataset as presented by the ***Student club list*** to 3rd normal form. Present your answer in the form of an Entity Relationship Diagram (ERD). Show all entities, relationships, cardinalities, fields, and applicable keys using the crows-foot notation. (20)

5.6 Read the following scenario and answer the question that follow



The XYZ college student club is a popular organisation amongst students. The college management has decided to fund the club for the development of a System that will assist the club with their operations.

Students that want to join will be required to provide their student details, and once registered they will be provided with their membership details and details of upcoming events.

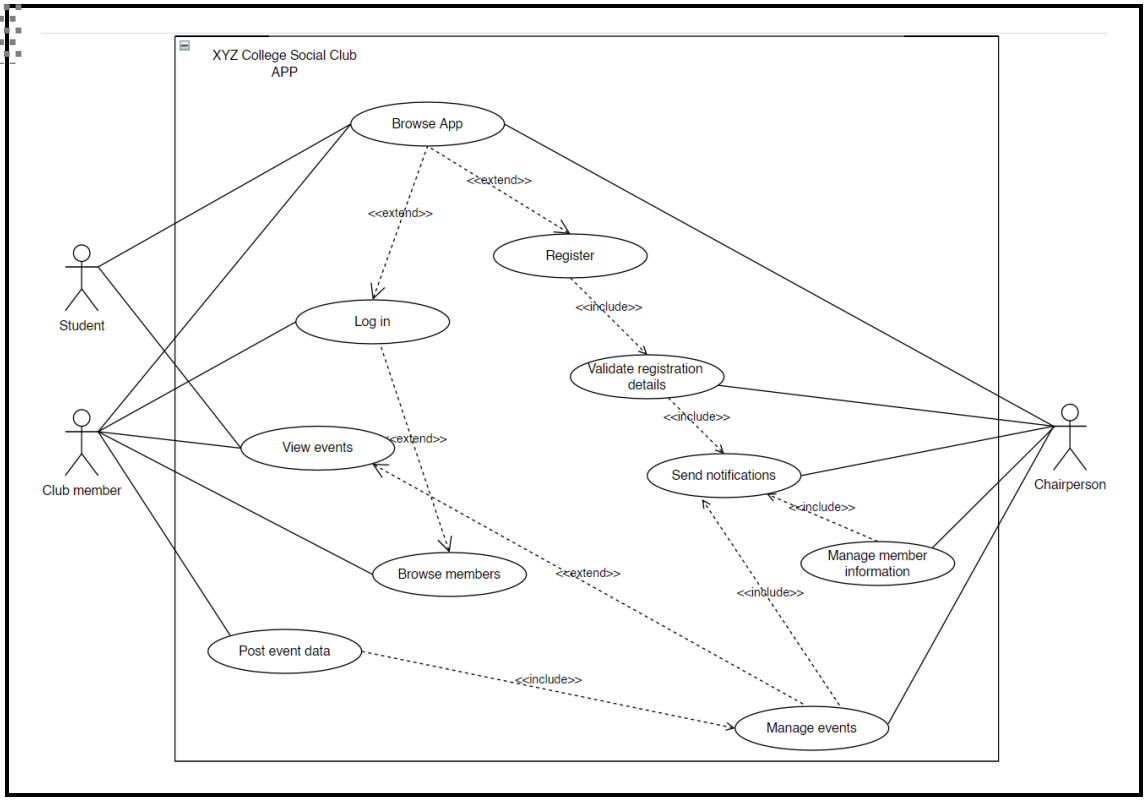
Event organisers will get information about event details and after the event has happed event feedback information will be posted to the system.

Various venues are utilised. The system will be able to get details about the venue which is supplied by potential venues and when selected the booking detail information will be sent to the venue management.

The student club has several partners and new partners can be registered by providing their details, whereafter they will receive confirmation of their registration. Partners are also informed of events.

Draw a context diagram for the XYZ Student Social club system. Include where applicable, all entities, processes and datastores. (10)

5.7 Study the following UML diagram and answer the questions that follow



UML Diagram

5.7.1 Identify the type of UML diagram presented. (1)

5.7.2 How many actors are involved? (1)

5.7.3 How may associations do the ***Student*** actor have? (1)

5.7.4 Explain what the block around all the ovals indicate? (2 × 1) (2)

5.7.5 Clearly differentiate between the use of the ***<<include>>*** and ***<<extend>>*** notations used between some use cases, by referring to an example of each in the diagram. ((1+1) × 2) (4)

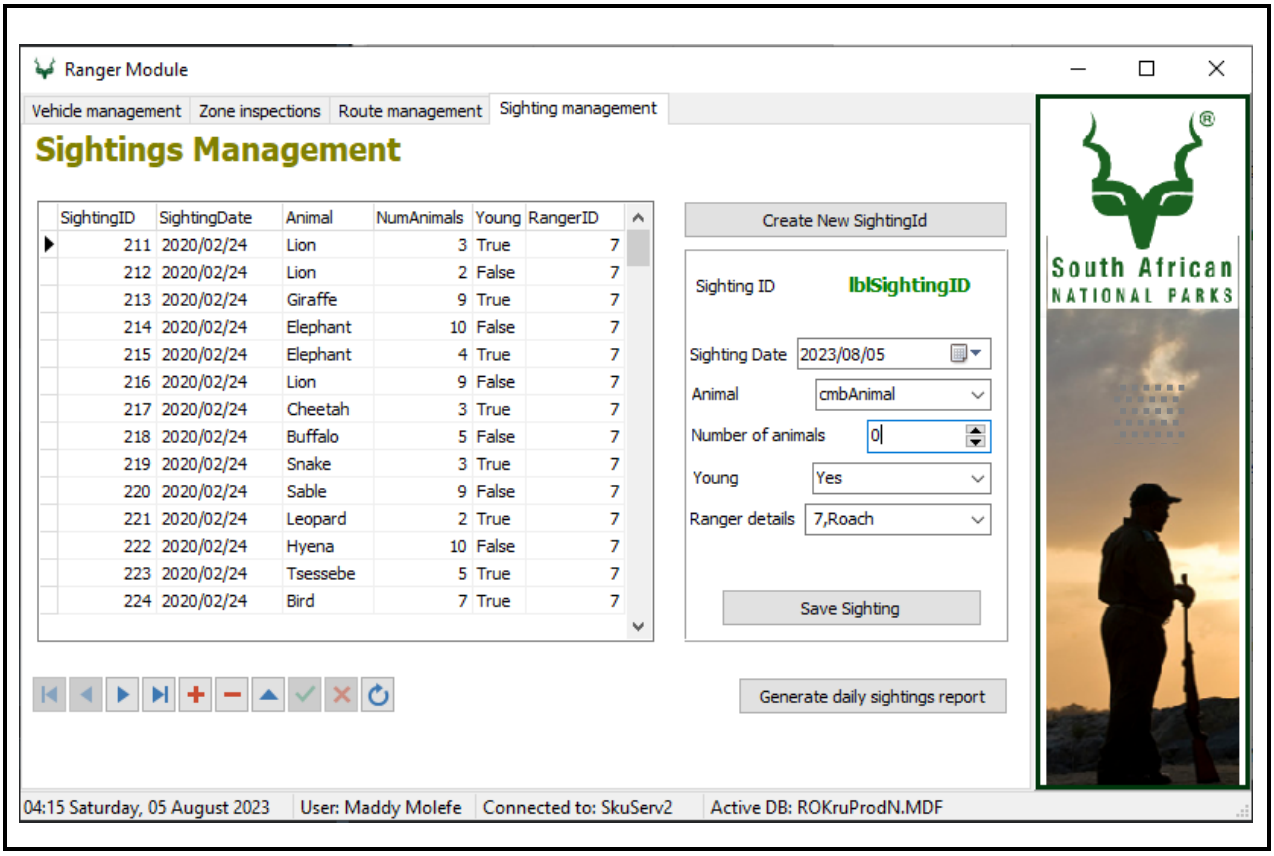
5.7.6 Expand the acronym UML (1)

5.8 Define the term Class Responsibility Collaboration Card in the context of object orientation. (2 × 1) (2)

[66]

QUESTION 6

Study the following application module GUI as part of a larger system and answer the questions that follow.



GUI

6.1 Is the application module an example of a front-end or back-end system? (1)

6.2 Motivate your answer for QUESTION 6.1 (2)

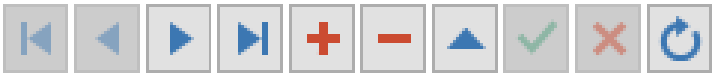
6.3 Define the term: *Information system* (2)

6.4 Explain the relationship between the terms: *Information system* and *GUI*. (2 × 2) (4)

6.5 Is the application linked to any database? (1)

6.6 Give ONE reason for your answer in QUESTION 6.5. (1)

6.7 What is the appropriate name for the following group of buttons?



(1)

6.8 As a systems analyst you notice that the first two buttons are greyed out. Do you think that there is an error with the application?



(1)

6.9 Give ONE reason for your answer in QUESTION 6.5. (1)

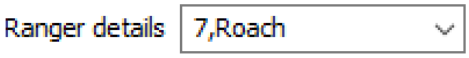
6.10 What is the function of the following button as it appears in the application?



(1)

6.11 Identify and list any TWO different types of data input controls used in the interface. (2 × 1) (2)

6.12 Examine the following component and its data content. (1)



What does the 7 before the name refer to?

6.13 What is the most likely datatype for the field: *Young* (1)

6.14 Besides, *Sighting management* and its related operations, what other functionality does the module provide the user? (1)

[20]

QUESTION 7

Read the following snippet and answer the questions below:

When adopting a new ICT system, effective strategies ensure successful implementation. Conducting a thorough needs assessment identifies specific requirements and challenges. Engaging employees through training fosters ownership and eases the transition. Incremental implementation with pilot groups allows testing and refinement. Regular communication and management support build confidence and mitigate resistance. Evaluating system performance and seeking feedback ensures continuous improvement and optimal utilisation.



7.1 Give another name for the *Incremental implementation* strategy. (1)

7.2 Differentiate between the THREE other implementation strategies. (3 × 2) (6)

7.3 Motivate why regular communication is important throughout the adoption process. (2 × 1) (2)

7.4 List any TWO factors that play a role in deciding which implementation strategy to choose. (2 × 1) (2)

7.5 List THREE reasons why the IT specialists should review their system after the administrators have implemented it. (3 × 1) (3)

[14]

QUESTION 8

Read the following snippet and answer the questions that follow.

The Agile methodology is an iterative and incremental approach to software development that prioritises flexibility, collaboration, and delivering value early and frequently.

8.1 Which Agile methodology is characterised by cycles or stages of development known as sprints? (1)

8.2 Which Agile methodology is known for its focus on software development best practices such as test-driven development, pair programming, continuous integration, and frequent releases, aiming to improve code quality and responsiveness to customer requirements? (1)

8.3 List TWO disadvantages of the Kanban methodology. (2 × 1) (2)

8.4 Expand the acronym FDD which is one example of an Agile methodology. (1)

[5]

TOTAL SECTION B: 160
GRAND TOTAL: 200

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